

XIX.—*Note on Diazona and Syntethys*. By W. A. HERDMAN, D.Sc., Professor of Natural History in University College, Liverpool.

MR. W. GARSTANG has lately drawn attention, in his "Report on the Tunicata of Plymouth" *, to the interesting point that the *Syntethys hebridicus* of Forbes and Goodsir has been considered by recent authors, on insufficient evidence, to be the same as *Diazona violacea*, Savigny, and that therefore it is possible that these two forms may be, if not distinct genera, at least distinct species.

The history of the matter is briefly as follows:—

Savigny, in 1816, described and figured † *Diazona violacea* from Mediterranean specimens found at the Balearic Isles, and established the genus *Diazona*, which he placed, in his 'Système des Ascidies,' at the head of the Téthyes composées immediately after the genus *Clavelina*. Amongst other points he describes and figures the colour as violet, the branchial and atrial apertures as being both distinctly six-rayed, the internal longitudinal bars of the branchial sac as bearing papillæ, and the meshes as containing each four stigmata.

Savigny was quoted and copied by various authors; but nothing of importance for the present purpose was added until 1851, when Forbes and Goodsir, in their paper "On some remarkable Marine Invertebrata new to the British Seas" ‡, described under the name of *Syntethys hebridicus* some specimens dredged in 30 fathoms close to Croulin Island, near Applecross, on the west coast of Scotland. They recognized the affinity of their new genus to Savigny's *Diazona*, and placed it between that genus and *Clavelina*. They point out that their species is of an apple-green hue, that the branchial and atrial apertures are not lobed (although the atrial has six white ocelli), that the ascidiozooids are marked by lines of white pigment, that the branchial sac has thirteen rows of stigmata, hooked fleshy tubercles at the angles of the meshes, and only one of the stigmata in each mesh. Forbes and Goodsir state as the characters distinguishing *Syntethys* from *Diazona* (1) the simple apertures and (2) the sessile abdomen; but, as Garstang has pointed out, the above details of structure of the branchial sac do not agree with those given by Savigny for *Diazona*.

* Journ. Mar. Biol. Assoc., n. s., vol. ii. no. 1, p. 47 (May 1891).

† Mém. pp. 35, 61, 116, pl. ii. fig. 3, and pl. xii.; Syst. p. 174.

‡ Trans. Roy. Soc. Edinb. vol. xx. pt. ii. p. 307.

Alder* in 1863 placed Forbes and Goodsir's species in the genus *Diazona* under the name of *D. hebridica*, and showed that it did not differ from Savigny's form in colour, since its living apple-green tint changed to violet on preservation in alcohol. He also noted that the apertures of his specimen from the Channel Islands were obscurely six-lobed, and thus brought the descriptions of the two forms so closely into accord that most subsequent writers have considered them to be the same species of *Diazona*, and the name *hebridica* has dropped out of use. *Diazona violacea* has since been found by Della Valle† and others in the Mediterranean, by Giard‡ off the south-west coast of Brittany, by Lahille§ off the north coast of Brittany and the Mediterranean coast of France, and by Garstang near Plymouth.

Lahille has recently (*loc. cit.* 1890) given a detailed description, and has shown that there may be as many as one hundred rows of stigmata in the branchial sac, that there are twenty-four tentacles, and that no true papillæ are placed at the angles of the meshes. His figures 136 and 137 show some meshes containing one, two, and three stigmata each. Finally, Garstang (1891), although admitting the generic identity of *Diazona* and *Syntethys*, tries to show that Alder's specimens from Guernsey were probably not identical with Forbes and Goodsir's species, and that the latter may be distinct from *D. violacea*. He points out the difference in the branchial sac between his own specimens from Plymouth, which he identifies as *D. violacea*, and the figures and description given by Forbes and Goodsir—the latter showing only thirteen rows of stigmata and only one of the stigmata in each mesh. Upon these and the other characters given by Forbes and Goodsir he redefines the species *Diazona hebridica*, but concludes by saying that "the whole matter is so beset with doubts that it is greatly to be desired that specimens should be obtained again from the Hebrides, and their anatomy redescribed" (*loc. cit.* p. 66). On reading this last sentence I at once remembered that I had in my collection a Hebridean specimen of *Diazona* dredged off the north coast of Mull in 1885 by the Duke of Argyll, and sent to me for identification through Dr. John Murray. I had examined the specimen in 1885, identified it as *D. violacea*, made some microscopic

* Ann. & Mag. Nat. Hist. (3) vol. xi. p. 169.

† 'Contrib. alla Storia naturale delle Ascidie composte del Golfo di Napoli,' 1877, p. 10; 'Nuove Contribuzioni,' 1881; and 'Sul Ringiovanimento &c.,' 1884.

‡ 'Comptes Rendus,' ciii. p. 755 (1886).

§ 'Recherches sur les Tuniciers,' &c., 1890, p. 257.

specimens of the ascidiozooids, a few drawings and some notes, and then laid it aside with the intention of returning to it again.

I have now, since reading Mr. Garstang's interesting remarks, re-examined the specimens of *Diazona* in my collection, which are:—

- (1) A colony labelled *D. violacea*, from the Zoological Station, Naples ;
- (2) Part of a colony from near Plymouth, kindly sent to me by Mr. Garstang ; and
- (3) The Hebridean colony, dredged by the Duke of Argyll to the north of Mull ;

with the result that I believe them all to be the same species, *D. violacea*.

To take up the supposed points of difference: in the first place, I find that many of the ascidiozooids in these preserved specimens have the branchial and atrial apertures so obscurely lobed that from the outside lobes cannot really be said to be present; and this is as much the case in the Naples and Plymouth specimens as in the Hebridean one. But when the test is removed and the siphons of the mantle are examined under the microscope it is found that in all three specimens each aperture is most distinctly six-lobed. In the condition of the apertures, then, my Hebridean colony is exactly like the southern forms, and in colour also the specimens (in spirit) are alike.

Then in regard to the number of transverse vessels or rows of stigmata in the branchial sac, I find in an ascidiozoid from the Naples colony over sixty rows, in one from the Hebridean specimen I have counted sixty-seven rows, and may have missed a few, and in the Plymouth specimen there are about eighty rows. It is difficult to get the exact number, as the rows are crowded in places; but the above numbers are under rather than over the mark, and they show clearly that the three colonies are practically alike in the extent of the branchial sac.

The next point is the number of stigmata in each mesh; and here I find very great variations in different parts of the branchial sac* in all three colonies. In the specimen from Plymouth I find most distinctly in some parts of the sac only one stigma in each mesh. There is also a single stigma behind each internal longitudinal bar, so that there are nearly

* Lalille (*loc. cit.* p. 257) figures, from Mediterranean specimens, meshes containing one, two, and three stigmata each.

twice as many stigmata present as are visible on the inner surface. The stigmata behind the bars seem to me smaller in size; but this I am not certain about. In other parts of this same sac I find meshes with two, three, or four stigmata. In the Naples specimen close to the dorsal edge, where the internal longitudinal bars are usually imperfect for as much as eight or nine series of meshes, I find the papilliform connecting-ducts, which indicate the position of undeveloped bars, placed one stigma apart, so that if meshes were formed there they would contain each one stigma only. In the Hebridean specimen there seem generally two or three stigmata in a mesh, sometimes four or five, some parts of the sac being in this respect exactly like Garstang's figure (*loc. cit.* pl. ii. fig. 7). I have not noticed meshes containing one stigma each so distinctly as in the Plymouth specimen, but I have no doubt such might be found by examining a few other ascidiozooids.

Finally, the "hooked fleshy tubercles" of Forbes and Goodsir's description can, as has been suggested before, be quite satisfactorily accounted for by the corrugation of the internal longitudinal bars, the thick prominent connecting-ducts which seem to project on each side where they join the bars, and the imperfect condition of the bars in some parts of the sac.

When a branchial sac is first opened and is examined in water under the microscope the appearance of large papillæ at the angles of the meshes is so distinct that it is difficult to realize, until the specimen has been stained, mounted, and examined with a high power, that only connecting-ducts and more or less irregular bars are present. There is no difficulty in understanding how some of the earlier investigators fell into the error of supposing that they saw large papillæ.

I think, then, that all the supposed peculiarities of *Syntethys hebridica* can be satisfactorily disposed of. Perhaps the only point in Forbes and Goodsir's description which still requires explanation is the thirteen rows of stigmata, and I can only suggest that, if there was no mistake about the observation, they may possibly have examined a young ascidiozooïd with rather a small branchial sac. Unless the branchial sac is a fairly large one and is well spread out, it is only too easy to miss a great many of the rows of stigmata.

It is still, of course, open to any one to say that the Hebridean specimen dredged by the Duke of Argyll is, as I have shown above, *Diazona violacea*, but is not necessarily Forbes and Goodsir's *Syntethys hebridicus*. This is conceivable, but is not at all likely, since the specimens are prac-

tically from the same locality, and since, as I have pointed out, the peculiarities in the description of *Syntethys* can be easily accounted for on the supposition that Forbes and Good-sir's specimens were, like the Duke of Argyll's, the *Diazona violacea* of Savigny.

XX.—*Contributions towards a General History of the Marine Polyzoa*, 1880–91.—*Appendix*. By the Rev. THOMAS HINCKS, B.A., F.R.S.

[Continued from p. 93.]

‘Annals,’ November 1880 (p. 28 sep.)

Steganoporella Rozieri, Audouin.

I have taken this species as the type of a new genus, *Thalamoporella*, distinguished from *Steganoporella* by important differences in the internal structure of the zoecium*.

Ibid. (p. 29 sep.).

Steganoporella elongata, sp. n.

This species must be referred to the genus *Micropora*. The structure of the *Steganoporellidæ* had not been thoroughly investigated when my description of it was published; later researches have shown that it is not a member of this family, but finds its proper place in the kindred tribe of the *Microporidæ*.

Ibid. (p. 30 sep.).

Steganoporella Jervoisii, sp. n.

This form belongs to the genus *Thalamoporella*. The list of the recent species of *Steganoporella* which I have given (p. 30) is from the cause just mentioned defective. The first of the species which it contains, *Eschara impressa*, Moll, must be removed from it. Of the rest, *Flustra Rozieri*, Audouin, *Membranipora gothica*, Busk (= *S. Rozieri*, form *gothica*, mihi), and *Steganoporella Smittii*, Hincks, belong to the genus *Thalamoporella*; *Membranipora magnilabris*, Busk, is the only representative of the genus *Steganoporella* as now defined.

* “Critical Notes on the Polyzoa,” ‘Annals’ for Feb. 1887, pp. 163, 164.